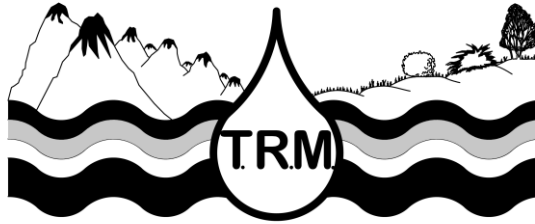




The River Mile Framework



Fourth - Fifth Grades

TRM
Connections
to
Washington State
Revised Science Standards

Working Model
2/12/2010



The River Mile Framework: Instructional Connections Grades 4-5

TRM Essential Question: How do we simultaneously use and protect our watershed?

Guiding Questions: How do we investigate cause and effect in the River Mile over time?
How does our investigative process lead to new questions about the flow of matter and energy within TRM system?

EALR 1 - Systems: Complex Systems

Analyze a system in terms of subsystems functions as well as inputs & outputs.

- Identify a plant or animal subsystem (e.g., circulatory, digestive, respiratory, skeletal, nervous, reproductive, or sensory)
- What can the whole system do that subsystems can't do alone?
- Predict what might happen to a system if one or more subsystems are missing or broken.
- Describe what goes into and comes out of TRM system (e.g., inputs: *sunlight, water, and CO₂*; and outputs: *O₂, vegetation, and animal waste products*). What happens to TRM if the input changes (e.g., more or less water)?

EALR 2 - Inquiry: Planning Investigations

Plan different kinds of investigations, including field studies, systematic observations, models, & controlled experiments.

- Identify and ask questions about a specific aspect of TRM. Gather evidence, plan an investigation, work collaboratively, select appropriate tools, and critique the investigation.
- Observe, record and organize data. Determine cause and effect. Compare and contrast, recognize fact and opinion, synthesize information, analyze data, and detect scientific bias. Is the investigation replicable?
- Create a simple model, use the model and explain similarities and differences between the model and the actual thing. Generate conclusions. Display findings and communicate with peers.

EALR 3 - Application: Different Technologies

Define technologies and technological design process to understand the use of technology in different cultures & career fields.

- Define a TRM problem and identify criteria for a successful solution. Research how other cultures, with similar problems, have investigated and tested solutions the problem.
- Use suitable tools to test a possible solution. Modify the inquiry and experimental design if needed. Retest and communicate your findings.
- Research specific ways science & technology have improved lives.
- Research careers that require people to apply their knowledge in science and technology.



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EALR 4 - Physical Science: Measurement of Force & Motion

Forces and motions can be measured.

- Use a spring scale to measure the weights of selected TRM objects. Use a table to record the data.
- Identify and record wind direction and relative wind speed using a compass and the Beaufort scale. What effect does wind force have on TRM objects of different weights?

EALR 4 - Physical Science: States of Matter

A single kind of matter can exist as a solid, liquid, or gas. Matter is conserved.

- Explain how liquid water is the same substance when it is frozen as ice or evaporated and becomes a gas.
- Explain how substances dissolved in water do not disappear and cite evidence to show that the substance is still present.
- While visiting TRM, collect water samples. Measure the water temperature and test for dissolved gasses & minerals such as oxygen, phosphorus, and nitrogen.

EALR 4 - Physical Science: Heat, Light, Sound & Electricity

Heat, light, sound & electrical energy can be transferred.

- Give examples of the three ways heat energy can move (e.g., conduction: *hot sands burning a bare foot*; convection: *hot magma under the surface of the earth extruded as volcanic rock*; and radiation: *solar energy passing through air*).
- Identify the vibrational energy of sounds moving throughout TRM (e.g., birdsong, wind, waves of water, jet engines, and voices).
- Learn about electrical circuits as preparation for understanding the conductivity testing for dissolved solids in water quality and the generation of hydroelectricity.

EALR 4 - Earth & Space Science: Earth in Space

Earth is spherical in shape. It spins on its axis and orbits the Sun.

- Connections to TRM require a night visit to observe how the visible constellations change over several hours.
- Note: Understanding this EALR is significant as a foundation for understanding seasonal changes in temperature resulting from the tilt of the earth's axis and the yearly orbit around the sun.

EALR 4 - Earth & Space Science: Formation of Earth Materials

Earth materials are formed by various natural processes & can

- Describe Earth Materials observed at TRM. List their physical and chemical properties. Explain how the properties are useful for specific purposes (e.g., Wood is useful for building homes but not useful for conducting electricity. Wood makes a good



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be used in different ways.	<p>insulator but will burn if struck by lightning).</p> <ul style="list-style-type: none">• Find examples of human made materials that are very similar to and very different from earth materials.• Find & explain examples of the physical and chemical processes of rock weathering. Find TRM examples of the forces of water and wind as major causes of erosion.• Find evidence of soil formation. Identify processes such as rock weathering, plant decay, settling of volcanic ash, transport of soil by rain, streams and rivers, and sediment deposition.• Compare soil layers for physical properties such as color, texture, particle size, quantity and type of dead plant and animal material, capacity for holding water.• Describe natural phenomena that reduce soil erosion.
EALR 4 - Earth & Space Science: Focus on Fossils	
Fossils provide evidence that environments of the past were quite different from what we observe today.	<ul style="list-style-type: none">• Investigate geologic fossil evidence at TRM in sediments and rock formations.• Infer environmental conditions for TRM that existed at the time the fossils formed.
EALR 4 - Life Science: Structures & Behaviors	
Plants & animals have different structures that meet their needs and respond to the environment.	<ul style="list-style-type: none">• Identify & sort plants and animals by structures (e.g., flowers, fruit, hair, feathers, or scales,) or behaviors (e.g., closing petals at night, consuming insects, grazing, hunting, or diving for food).• List physical parts and describe how it helps the plant or animal meet its basic needs• Given an animal behavior (e.g., salmon swim upstream to spawn, and owls hunt at night) describe the function it serves.• Give examples of how plants and animals respond to their environment (e.g., plants grow toward light, and animal hide from predators).



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EALR 4 - Life Science: Food Webs

Changes in ecosystems affect populations that can be supported in a food web.	<ul style="list-style-type: none">• Identify living & non-living parts of TRM ecosystem.• Find evidence of plants & animals that depend on one another for survival (e.g., worms decompose waste and return nutrients to the soil which helps plants grow; and coyote eat rabbits that eat plants and grasses).• Identify organisms in TRM classified as producers, consumers, and decomposers. Draw and explain a simple food web.• Predict how slow and/or rapid changes in TRM ecosystem might impact a specific plant or animal (e.g., a forest fire, a flood, an invasive species, or temperatures rise 10 degrees over 10 years).
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EALR 4 - Life Science: Heredity & Adaptation

Ecosystems change. Organisms that can adapt to these changes will survive and reproduce in higher numbers.	<ul style="list-style-type: none">• Describe ways humans can improve the health of an ecosystem (e.g., recycling, rain gardens, planting native species to prevent flooding and erosion and removing toxins from wastewater).• Why do some populations in an ecosystem thrive while others decline or do not survive? Investigate fossil evidence.• Look for evidence at TRM of a species that is struggling to survive and a species that is thriving. Infer reasons for its survival success and/or failure. Are these a result of inherited characteristics or environmental interactions?
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Stewardship of Our River Mile

	Identify an invasive species and work with the National Park Service to plan a community restoration event to reduce the non-native plant population and restore native plants.
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Units of Study that can be reinforced by visits to The River Mile location are:

FOSS Kit: Earth Materials	FOSS Kit: Food & Nutrition
FOSS Kit: Human Body	FOSS Kit: Environments
FOSS Kit: Magnetism & Electricity	FOSS Kit: Landforms
FOSS Kit: Physics of Sound	FOSS Kit: Levers & Pulleys
FOSS Kit: Structures of Life	FOSS Kit: Variables
FOSS Kit: Water	

Teacher Developed units: Salmon, fish anatomy, fresh & salt water adaptation

NPS Resource Managers Related Projects & Programs: